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2852



Docket No. 201887US2

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

IN RE APPLICATION OF: Masumi SATO, et al.

SERIAL NO: 09/758,192 GAU: 2852

FILED: January 12, 2001 EXAMINER: GRAINGER, QUANA MASHELL

FOR: CHARGING ROLLER HAVING ELASTIC MEMBER

# INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.97

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:
Applicant(s) wish to disclose the following information.

**REFERENCES**

☐ The applicant(s) wish to make of record the references listed on the attached form PTO-1449. Copies of the listed references are attached, where required, as are either statements of relevancy or any readily available English translations of pertinent portions of any non-English language references.

☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

**RELATED CASES**

■ Attached is a list of applicant's pending application(s) or issued patent(s) which may be related to the present application. A copy of the claims and drawings of the pending application(s) is attached.

☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

**CERTIFICATION**

☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement.

■ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the undersigned, having made reasonable inquiry, was known to any individual designated in 37 CFR §1.56(c) more than three months prior to the filing of this statement.

**DEPOSIT ACCOUNT**

■ Please charge any additional fees for the papers being filed herewith and for which no check or credit card payment is enclosed herewith, or credit any overpayment to deposit account number 15-0030. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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## LIST OF RELATED CASES

| Docket Number | Serial or Patent Number | Filing or Issue Date | Inventor/ Applicant |
|---|---|---|---|
| 201887US2* | 09/758,192 | 01/12/01 | SATO et al. |
| 242582US2 | 10/660,699 | 09/12/03 | ISHIBASHI et al. |



*Present Application; listed for information

What is claimed is:

1. In an image forming apparatus for sequentially transferring toner images from a plurality of image carriers to a sheet being conveyed by an image transfer belt one above the other with bias applying members to thereby form a composite color image, backup rollers, contacting an inside surface of said image transfer belt, each have a volumetric resistivity of $10^9$ Ω·cm or above and a surface roughness Rz of 6 μm or above.

2. The apparatus as claimed in claim 1, wherein said backup rollers, constituting auxiliary rollers for forming nips for image transfer, each are positioned close to the nip of a particular image transfer position at an upstream side of said nip in a direction of movement of said image transfer belt.

3. The apparatus as claimed in claim 2, wherein said bias applying members each comprise an elastic member configured to exert a suitable degree of pressure based on elasticity on an associated one of said plurality of image carriers via said image transfer belt.

4. The apparatus as claimed in claim 3, wherein said bias applying members each comprise a brush.

5. The apparatus as claimed in claim 3, wherein said bias applying members each comprise a Mylar sheet.

6. The apparatus as claimed in claim 3, wherein said

bias applying members each comprise a blade.

7. The apparatus as claimed in claim 2, wherein said plurality of image carriers each have an outside diameter of 40 mm or below.

8. The apparatus as claimed in claim 1, wherein said image transfer belt has a volume resistivity of $10^{10}$ Ω·cm or above.

9. The apparatus as claimed in claim 1, wherein said apparatus is capable of forming images on both surfaces of a sheet.

10. The apparatus as claimed in claim 1, wherein said backup rollers each comprise a metallic core and a resin layer formed on said metallic core.

11. The apparatus as claimed in claim 1, wherein surfaces of said backup rollers are roughened by component rolling using a die.

12. In an image forming apparatus for sequentially transferring toner images from a plurality of image carriers to a sheet being conveyed by an image transfer belt one above the other with bias applying members to thereby form a composite color image, backup rollers, contacting an inside surface of said image transfer belt, each have a volumetric resistivity of $10^{9}$ Ω·cm or above and a surface roughness Ra of 1.5 μm or above.

13. The apparatus as claimed in claim 12, wherein

said backup rollers, constituting auxiliary rollers for forming nips for image transfer, each are positioned close to the nip of a particular image transfer position at an upstream side of said nip in a direction of movement of said image transfer belt.

14. The apparatus as claimed in claim 13, wherein said bias applying members each comprise an elastic member configured to exert a suitable degree of pressure based on elasticity on an associated one of said plurality of image carriers via said image transfer belt.

15. The apparatus as claimed in claim 14, wherein said bias applying members each comprise a brush.

16. The apparatus as claimed in claim 15, wherein said bias applying members each comprise a Mylar sheet.

17. The apparatus as claimed in claim 15, wherein said bias applying members each comprise a blade.

18. The apparatus as claimed in claim 15, wherein said plurality of image carriers each have an outside diameter of 40 mm or below.

19. The apparatus as claimed in claim 14, wherein said image transfer belt has a volume resistivity of $10^{10}$ $\Omega \cdot cm$ or above.

20. The apparatus as claimed in claim 13, wherein said apparatus is capable of forming images on both surfaces of a sheet.

21. The apparatus as claimed in claim 13, wherein said backup rollers each comprise a metallic core and a resin layer formed on said metallic core.

22. The apparatus as claimed in claim 13, wherein surfaces of said backup rollers are roughened by component rolling using a die.

23. In an image forming apparatus for sequentially transferring a plurality of toner images of different colors from an image carrier to an intermediate image transfer belt one above the other with a bias applying member to thereby form a composite color image and then transferring said composite color image to a recording medium, a high-resistance backup roller, contacting an inside surface of said intermediate image transfer belt, has a volumetric resistivity of $10^{10}$ Ω·cm or above and a ten-point mean surface roughness Rz of 6 μm or above or an arithmetic mean surface roughness Ra of 1.5 μm or above.

24. The apparatus as claimed in claim 23, wherein said image carrier comprises a plurality of image carriers each being assigned to a particular color, and said high-resistance backup roller, constituting an auxiliary roller for forming a nip for image transfer, comprises a plurality of high-resistance backup rollers each being positioned close to said nip at an upstream side of said nip in a direction of movement of said intermediate image

transfer belt.

25. The apparatus as claimed in claim 23, wherein said bias applying member contacts the inside surface of said intermediate image transfer belt and presses said intermediate image transfer belt against said image carrier with preselected pressure based on elasticity of said bias applying means.

26. The apparatus as claimed in claim 23, wherein said bias applying member comprises a roller.

27. The apparatus as claimed in claim 23, wherein said bias applying member comprises a brush.

28. The apparatus as claimed in claim 23, wherein said bias applying member comprises a Mylar sheet.

29. The apparatus as claimed in claim 23, wherein said bias applying member comprises a blade.

30. The apparatus as claimed in claim 23, wherein said image carrier has an outside diameter of 40 mm or below.

31. The apparatus as claimed in claim 23, wherein said intermediate image transfer belt has a surface resistivity of $10^{12}$ $\Omega \cdot cm^2$ or above.

32. The apparatus as claimed in claim 23, wherein said high-resistance backup roller comprises a metallic core and a resin layer formed on said metallic core.

33. The apparatus as claimed in claim 23, wherein

a surface layer of said high-resistance backup roller is provided with an initial ten-point mean roughness Rz of 12 μm or above by sandblasting.

34. The apparatus as claimed in claim 23, wherein a surface of said high-resistance backup roller is roughened to have a preselected roughness by sandblasting.

35. The apparatus as claimed in claim 23, wherein a surface of said high-resistance backup roller is provided with an initial ten-point mean roughness Rz of 7 μm or above.

36. In an intermediate image transfer belt for carrying a composite color image, which is formed by transferring a plurality of toner images of different colors from an image carrier one above the other, and transferring said composite color image to a recording medium, a high-resistance backup roller, contacting an inside surface of said intermediate image transfer belt, has a volumetric resistivity of $10^{10}$ Ω·cm or above and a ten-point mean surface roughness Rz of 6 μm or above or an arithmetic mean surface roughness Ra of 1.5 μm or above.

37. The apparatus as claimed in claim 36, wherein said intermediate image transfer belt has a surface resistivity of $10^{12}$ Ω·cm$^2$ or above.

## ABSTRACT

An image forming apparatus of the present invention disclosed is of the type sequentially transferring toner images from a plurality of photoconductive drums to a sheet being conveyed by an image transfer belt or an intermediate image transfer belt one above the other with bias applying members to thereby form a composite color image. Backup rollers, contacting the inside surface of the belt, each have volumetric resistivity of $10^9$ Ω·cm or above and ten-point mean surface roughness Rz of 6 μm or above.

A-03061 FIGS. 1 - 19

FIG. 1

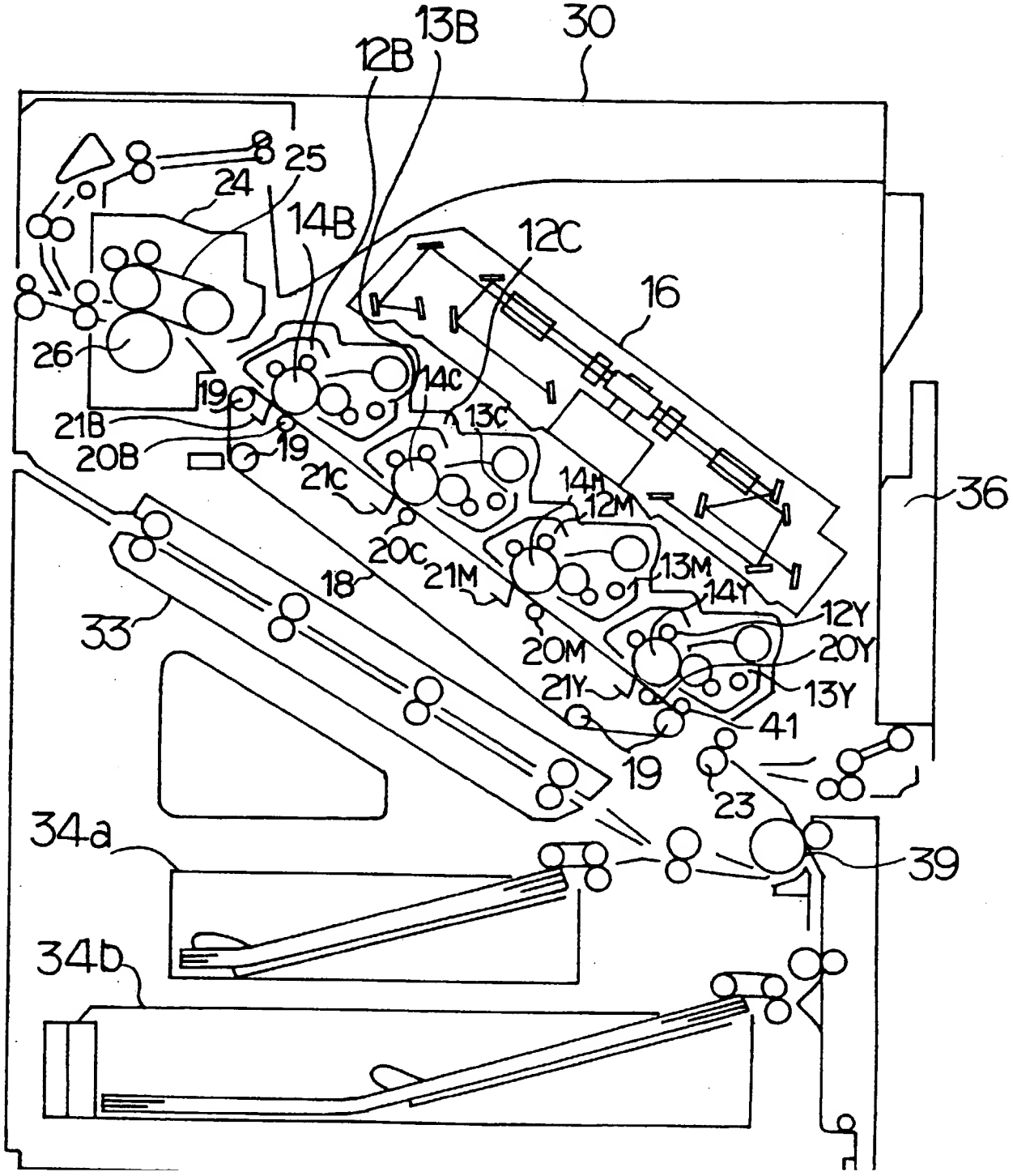

FIG. 2

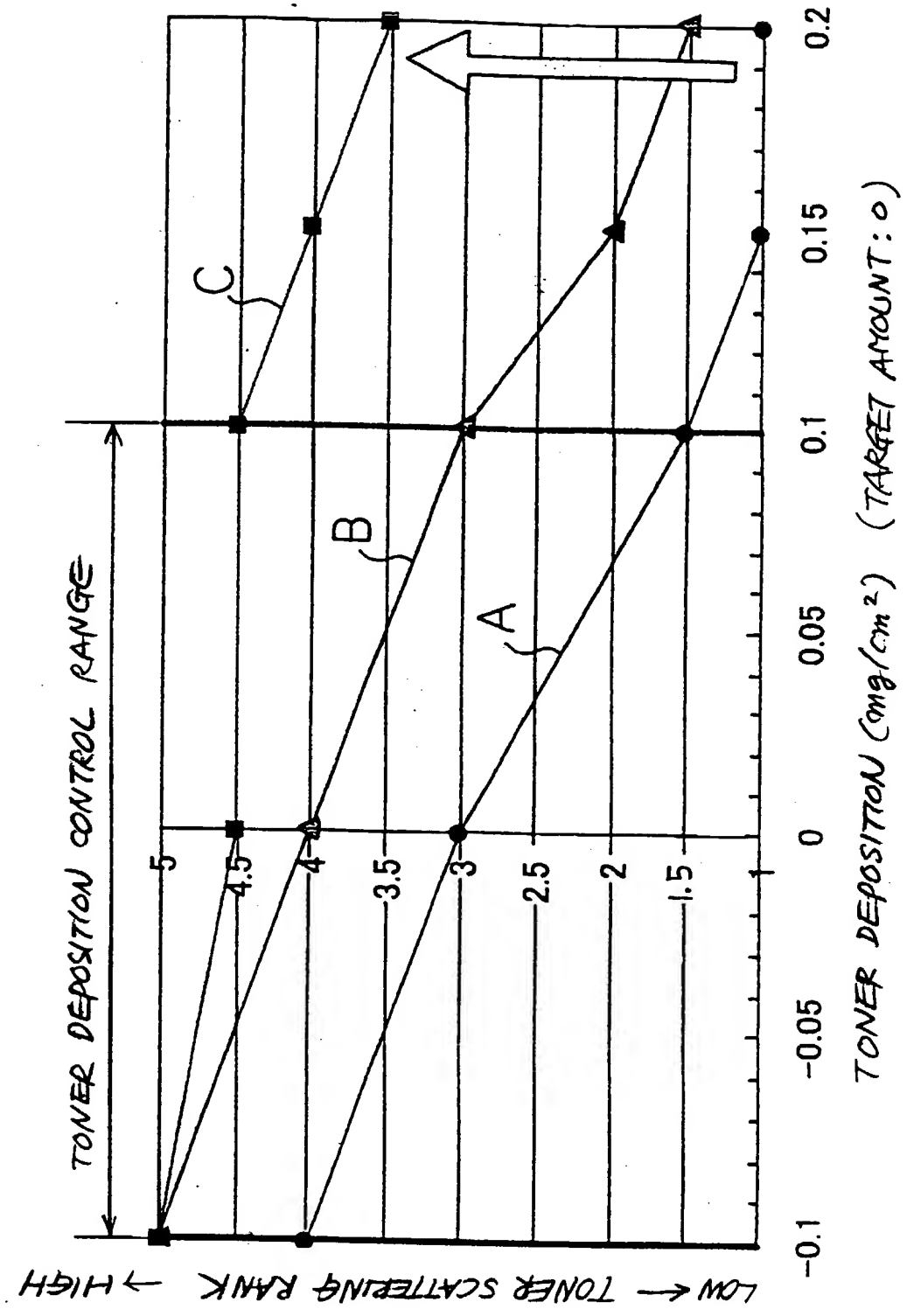
TONER DEPOSITION CONTROL RANGE
A
B
C
5
4.5
4
3.5
3
2.5
2
1.5
1
0.2
0.15
0.1
0.05
0
-0.05
-0.1
TONER DEPOSITION (mg/cm²) (TARGET AMOUNT: 0)
LOW ← TONER SCATTERING RANK → HIGH

FIG. 3

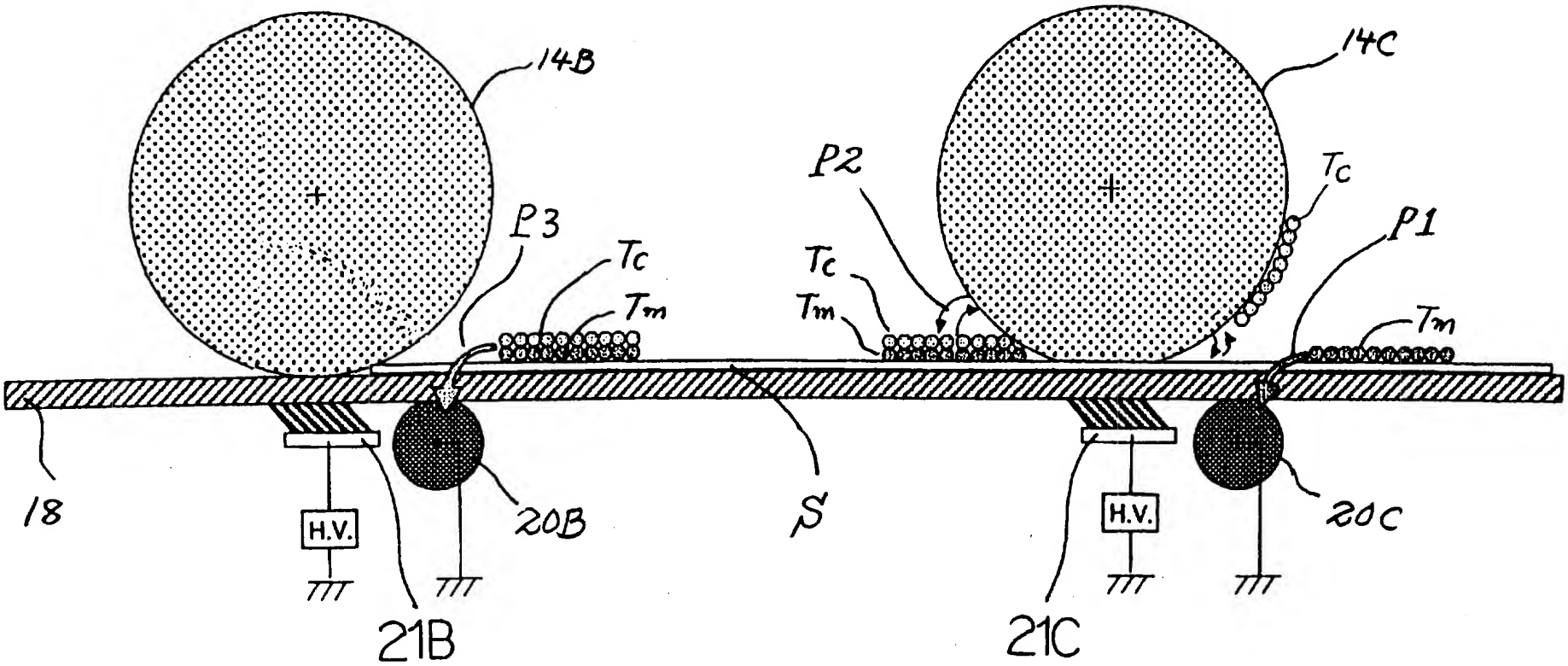

FIG. 4

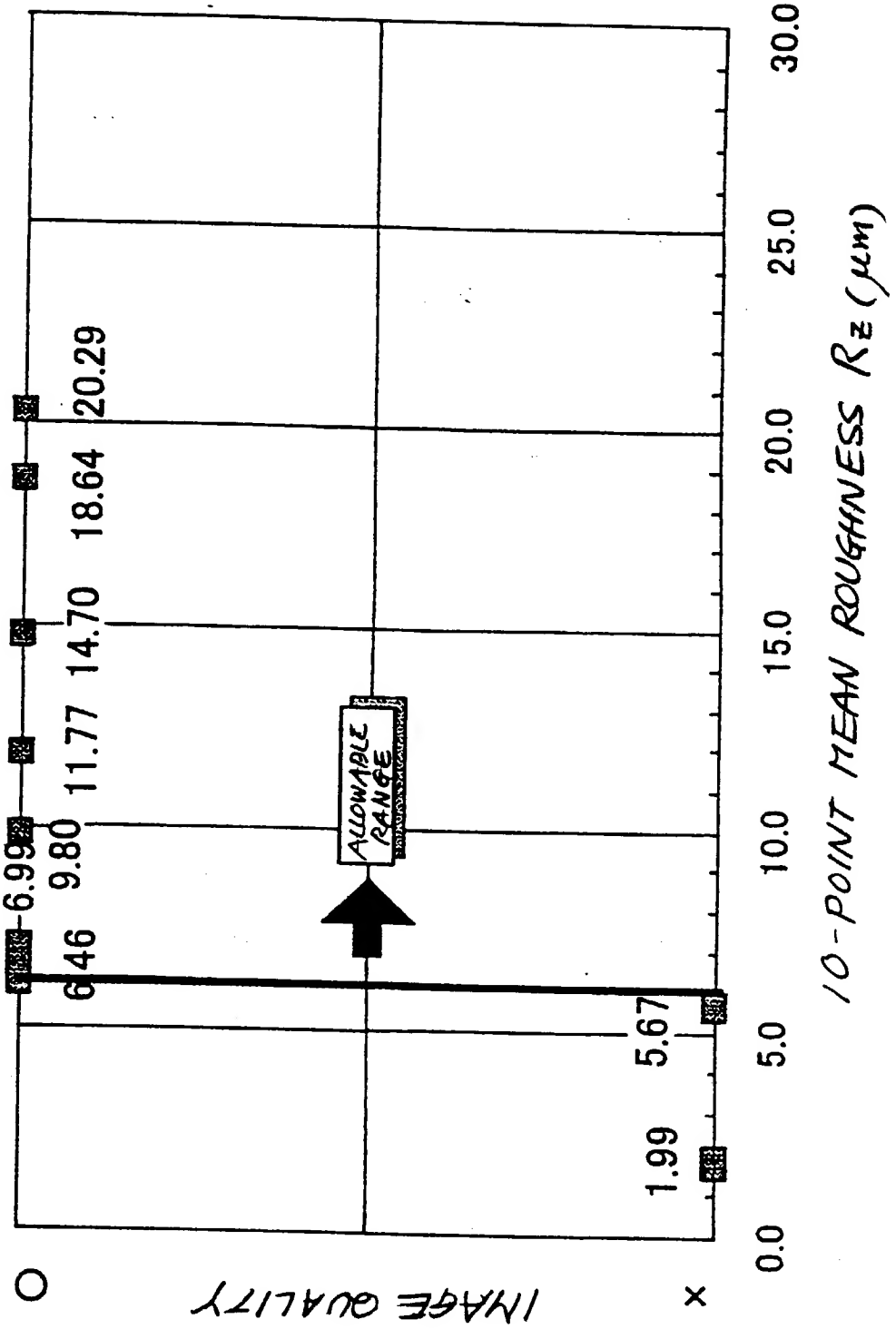
IMAGE QUALITY
O
X
ALLOWABLE RANGE
6.46
6.99
9.80
11.77
14.70
18.64
20.29
1.99
5.67
0.0
5.0
10.0
15.0
20.0
25.0
30.0
10-POINT MEAN ROUGHNESS Rz (μm)

FIG. 5

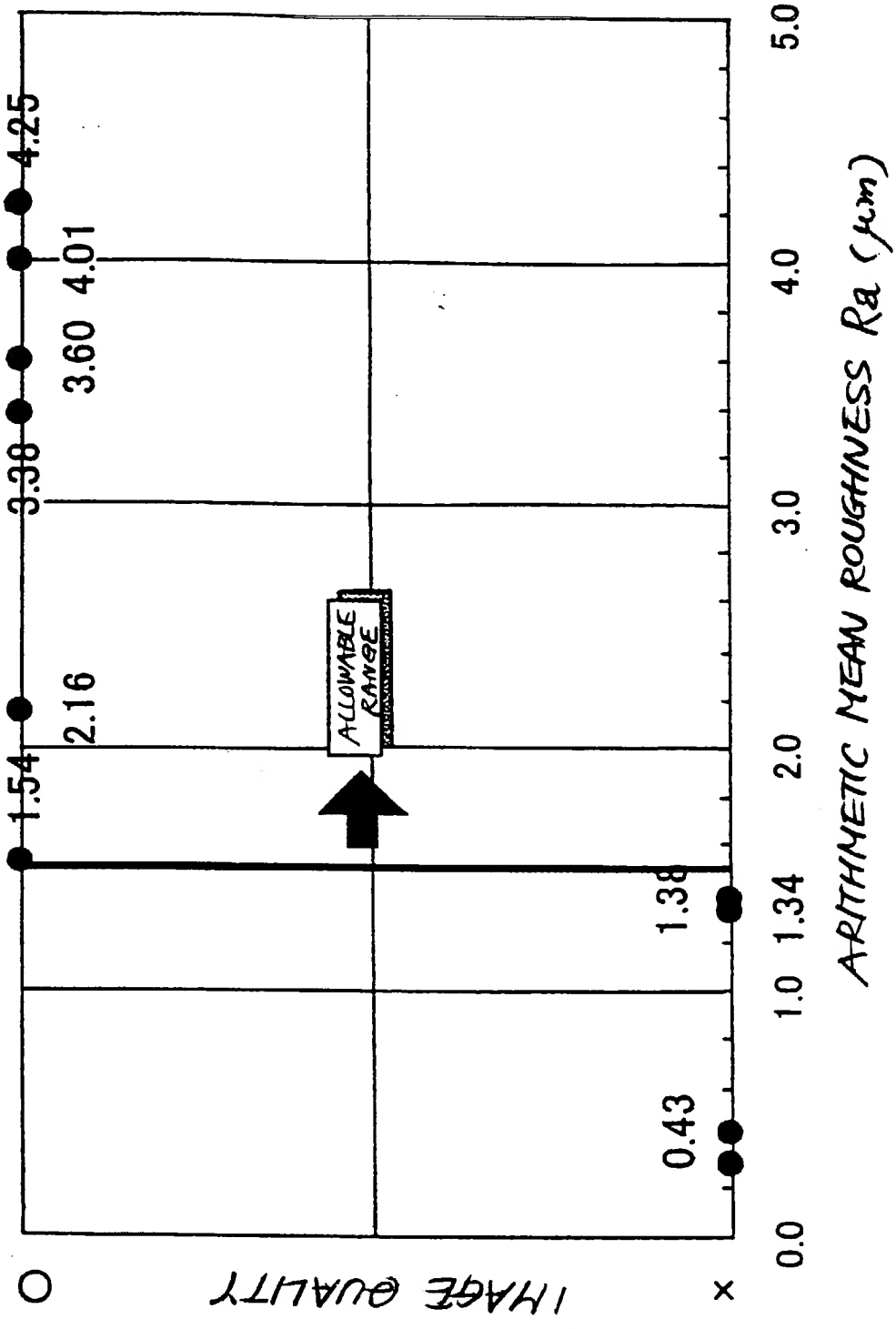
IMAGE QUALITY
O
X
0.0
1.0
2.0
3.0
4.0
5.0
ARITHMETIC MEAN ROUGHNESS Ra (μm)
0.43
1.38
1.34
1.54
2.16
3.38
3.60
4.01
4.25
ALLOWABLE RANGE

FIG. 6A

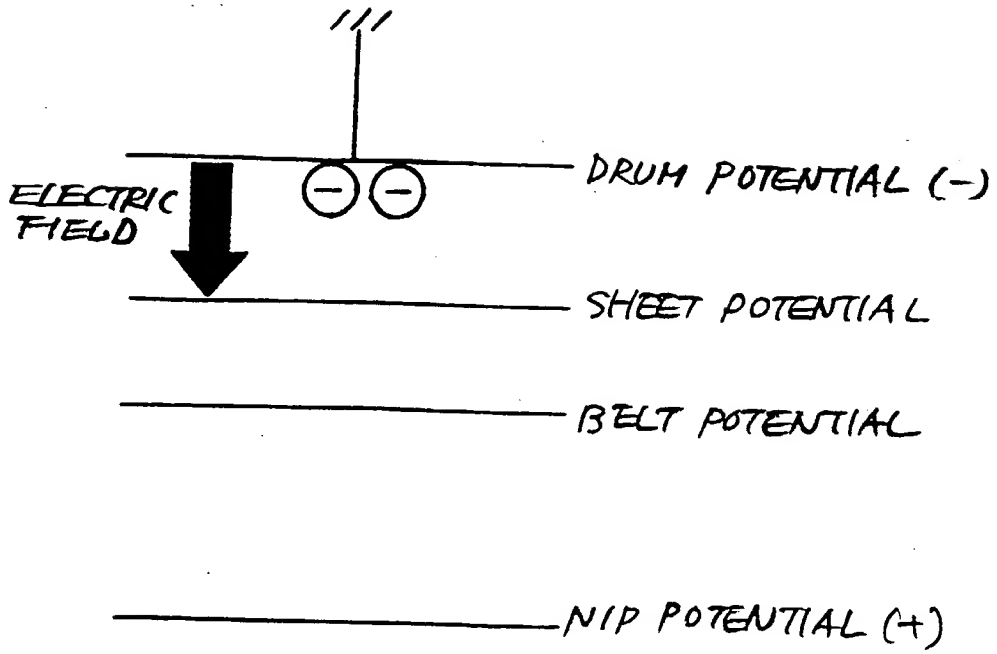
DRUM POTENTIAL (-)
ELECTRIC FIELD
SHEET POTENTIAL
BELT POTENTIAL
NIP POTENTIAL (+)

FIG. 6B

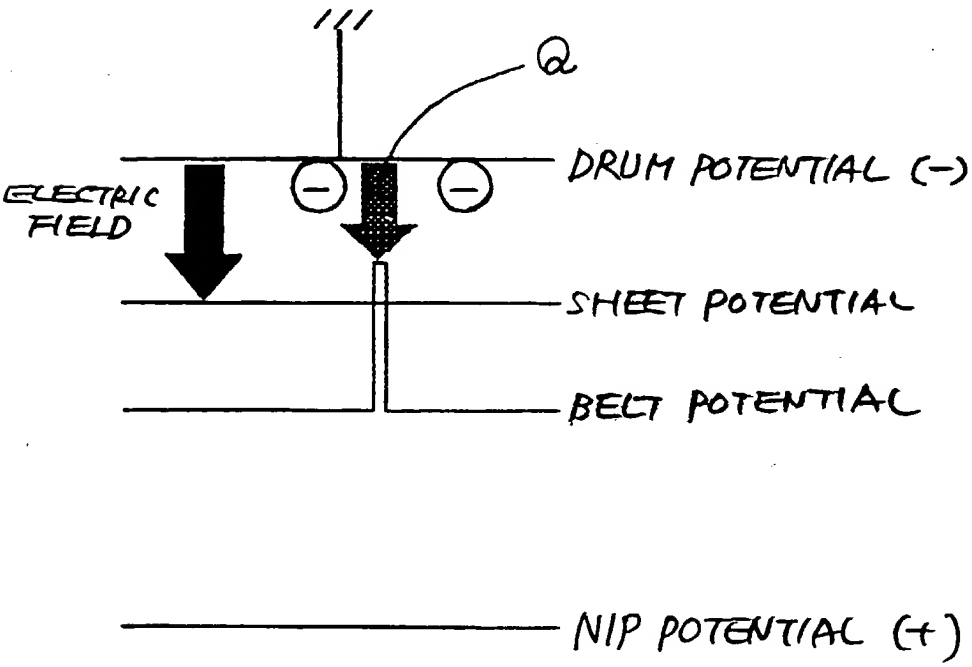
Q
DRUM POTENTIAL (-)
ELECTRIC FIELD
SHEET POTENTIAL
BELT POTENTIAL
NIP POTENTIAL (+)

FIG. 7

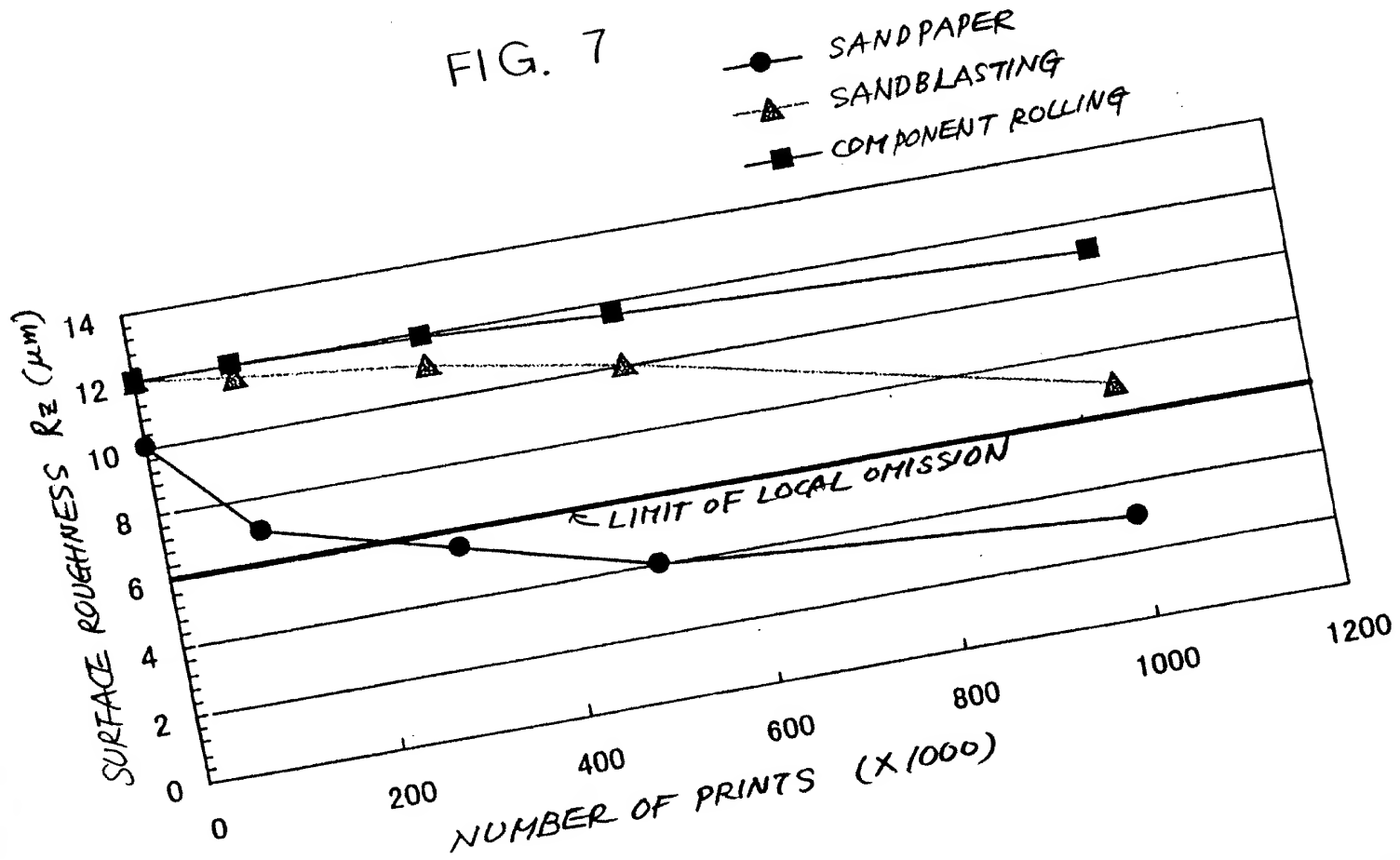
SANDPAPER
SANDBLASTING
COMPONENT ROLLING
LIMIT OF LOCAL OMISSION
SURFACE ROUGHNESS Rz (μm)
0
2
4
6
8
10
12
14
0
200
400
600
800
1000
1200
NUMBER OF PRINTS (X1000)

FIG. 8

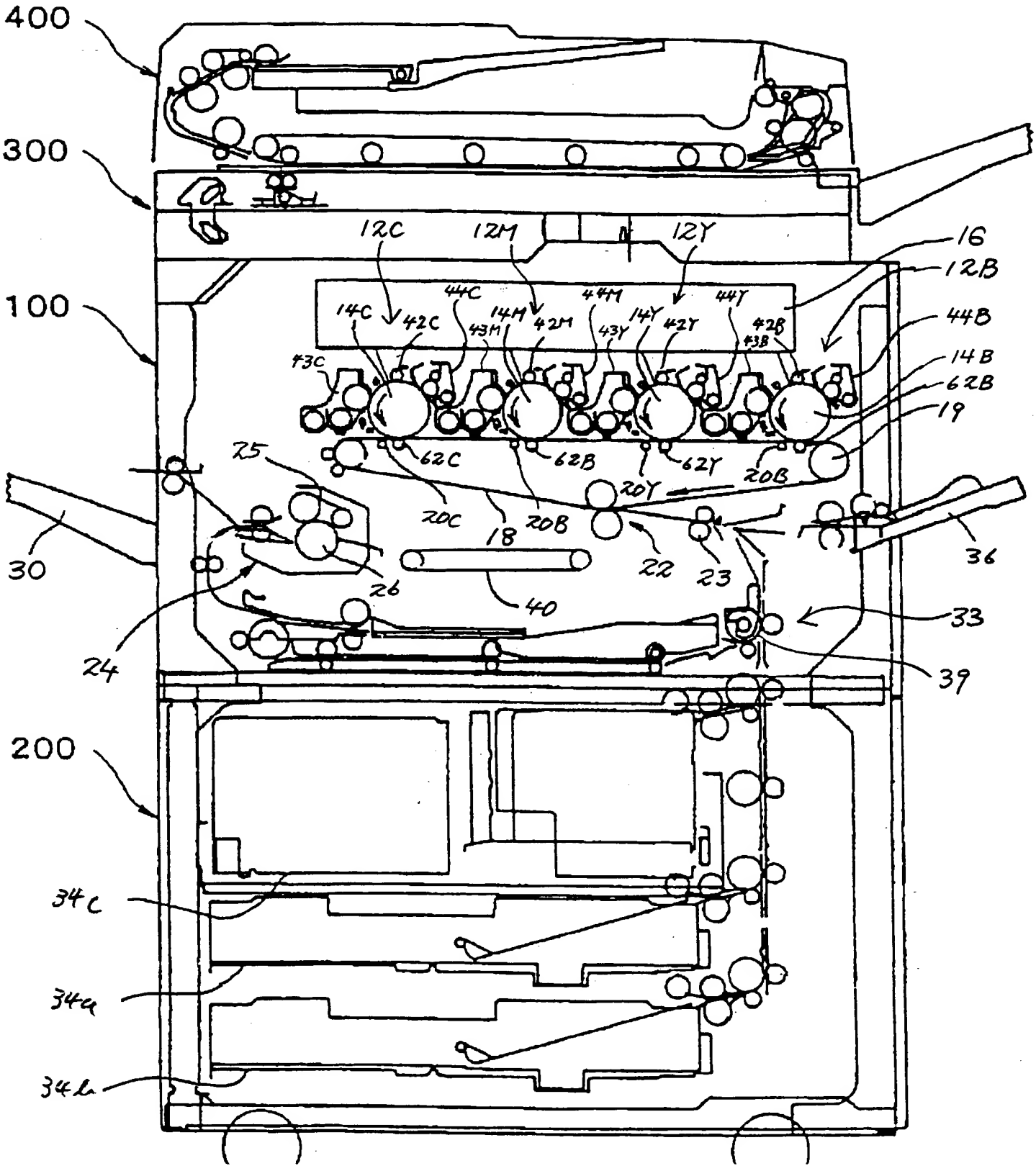
400
300
100
200
12C
12M
12Y
16
12B
44C
44M
44Y
14C
42C
14M
42M
14Y
42Y
42B
43C
43M
43Y
43B
44B
14B
62B
19
62C
62B
62Y
20B
25
20Y
20C
18
20B
22
23
36
30
26
40
33
24
39
34c
34a
34b

FIG. 9

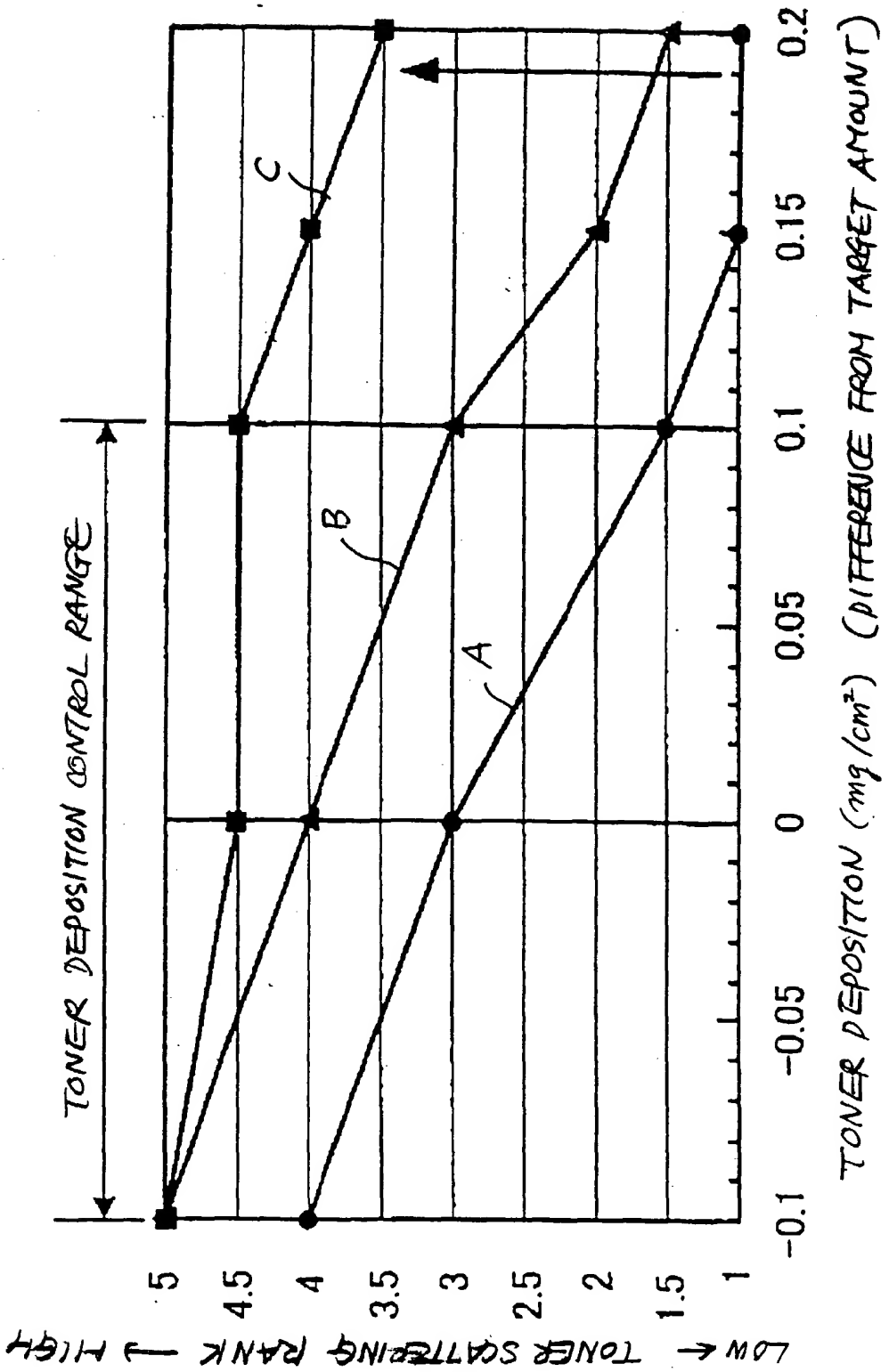
TONER DEPOSITION CONTROL RANGE
A
B
C
5
4.5
4
3.5
3
2.5
2
1.5
1
LOW ← TONER SCATTERING RANK → HIGH
-0.1
-0.05
0
0.05
0.1
0.15
0.2
TONER DEPOSITION (mg/cm²) (DIFFERENCE FROM TARGET AMOUNT)

FIG. 10

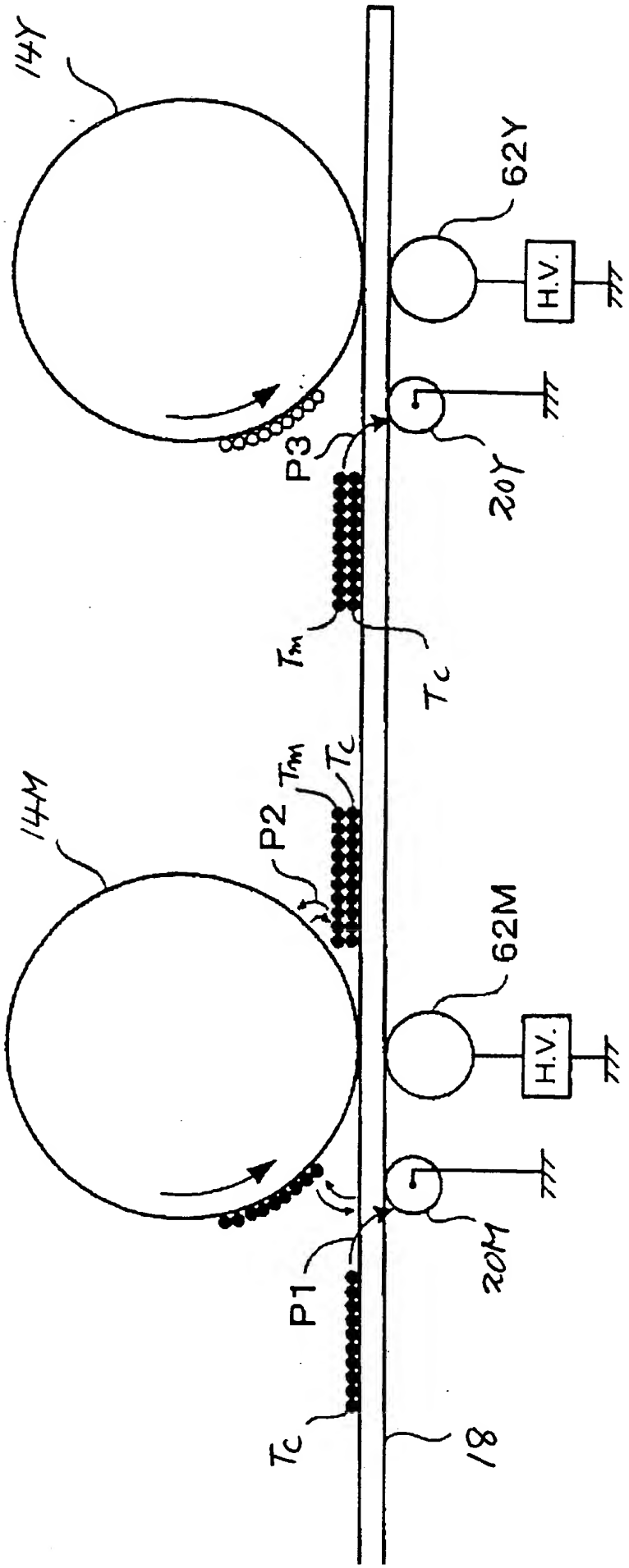

FIG. 11

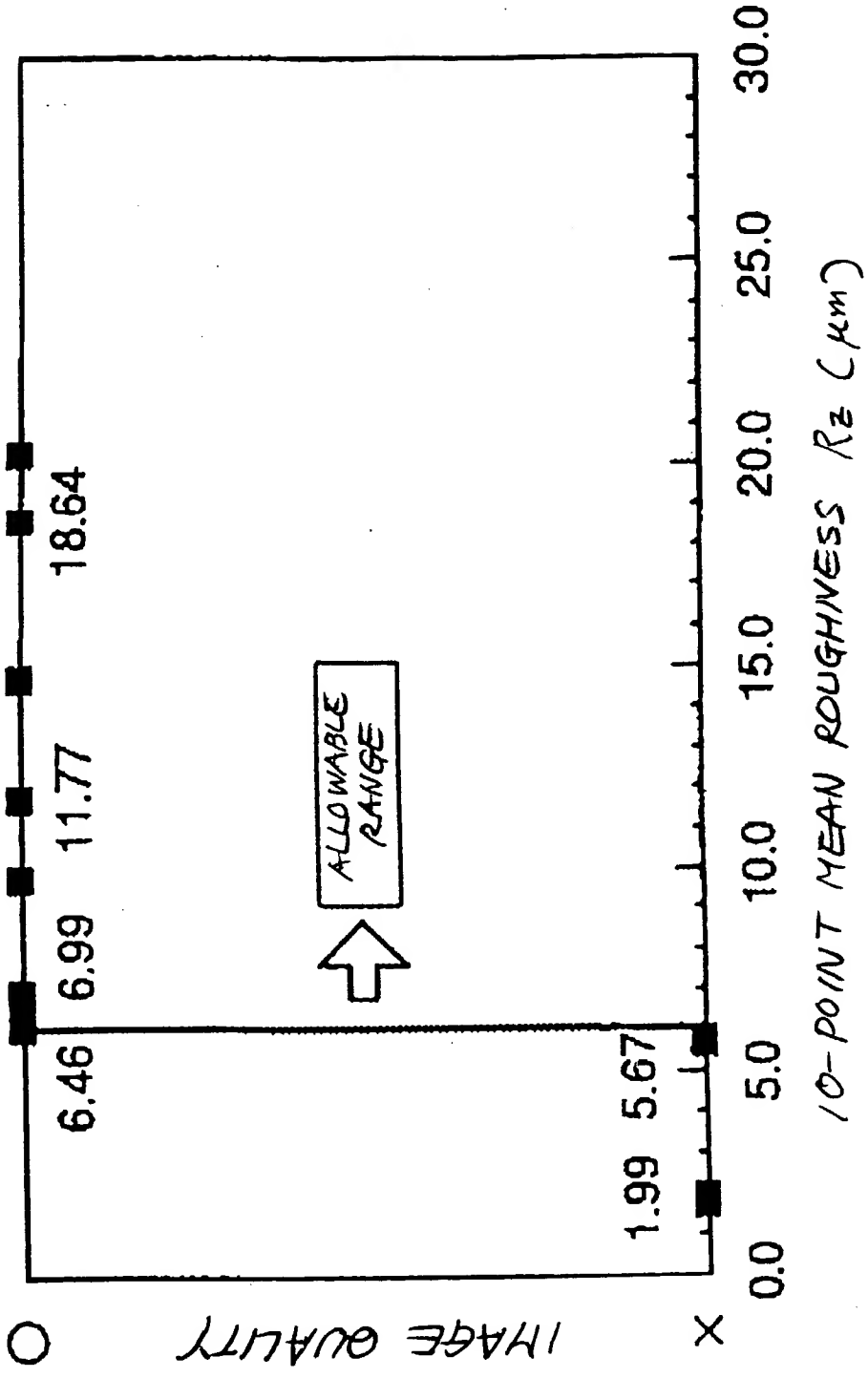
IMAGE QUALITY
O
X
ALLOWABLE RANGE
9.80
14.70
20.29
11.77
18.64
6.99
6.46
1.99
5.67
0.0
5.0
10.0
15.0
20.0
25.0
30.0
10-POINT MEAN ROUGHNESS Rz (μm)

FIG. 12

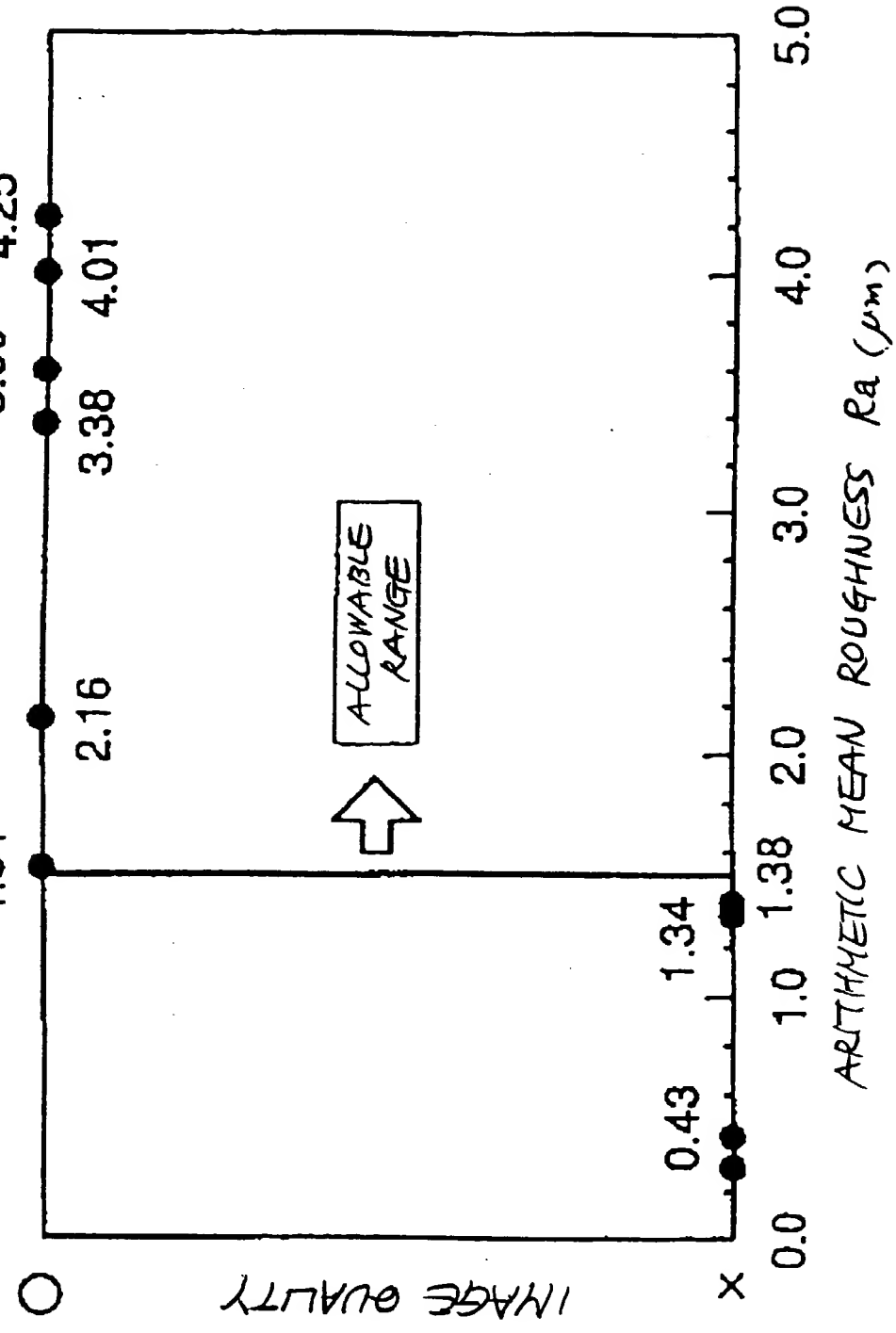
IMAGE QUALITY
O
X
ALLOWABLE RANGE
1.54
2.16
3.60
3.38
4.25
4.01
0.43
1.34
0.0
1.0
1.38
2.0
3.0
4.0
5.0
ARITHMETIC MEAN ROUGHNESS Ra (μm)

FIG. 13A

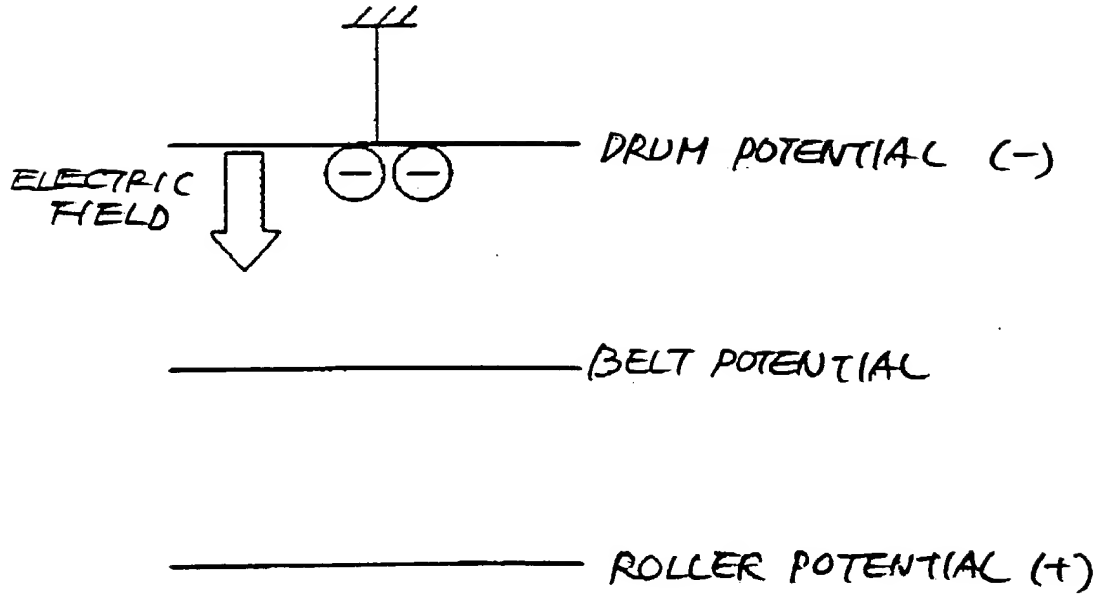


FIG. 13B

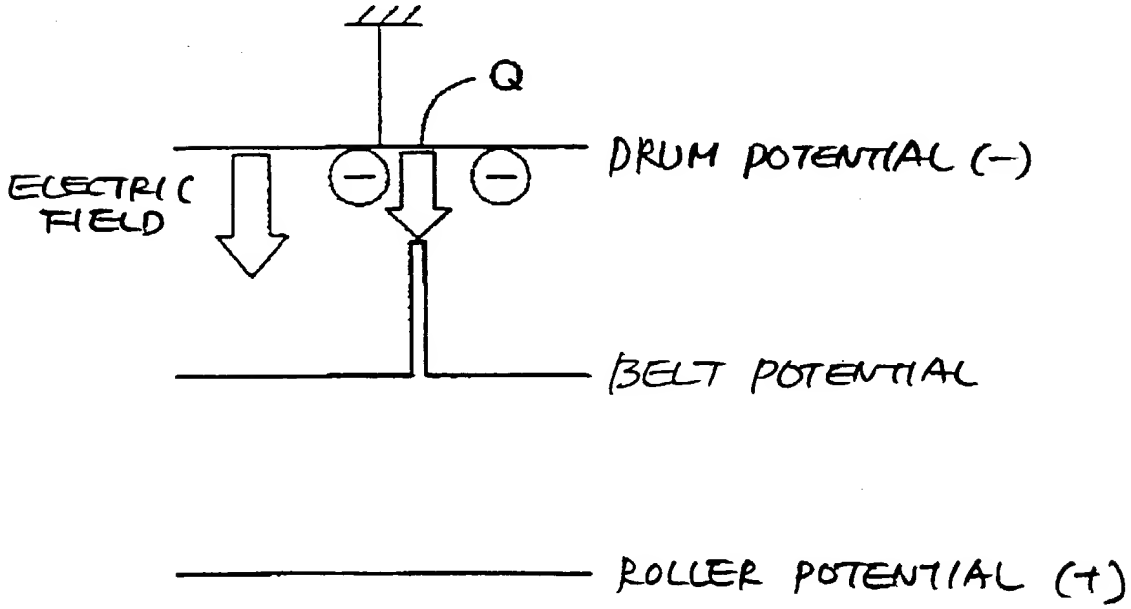

FIG. 14

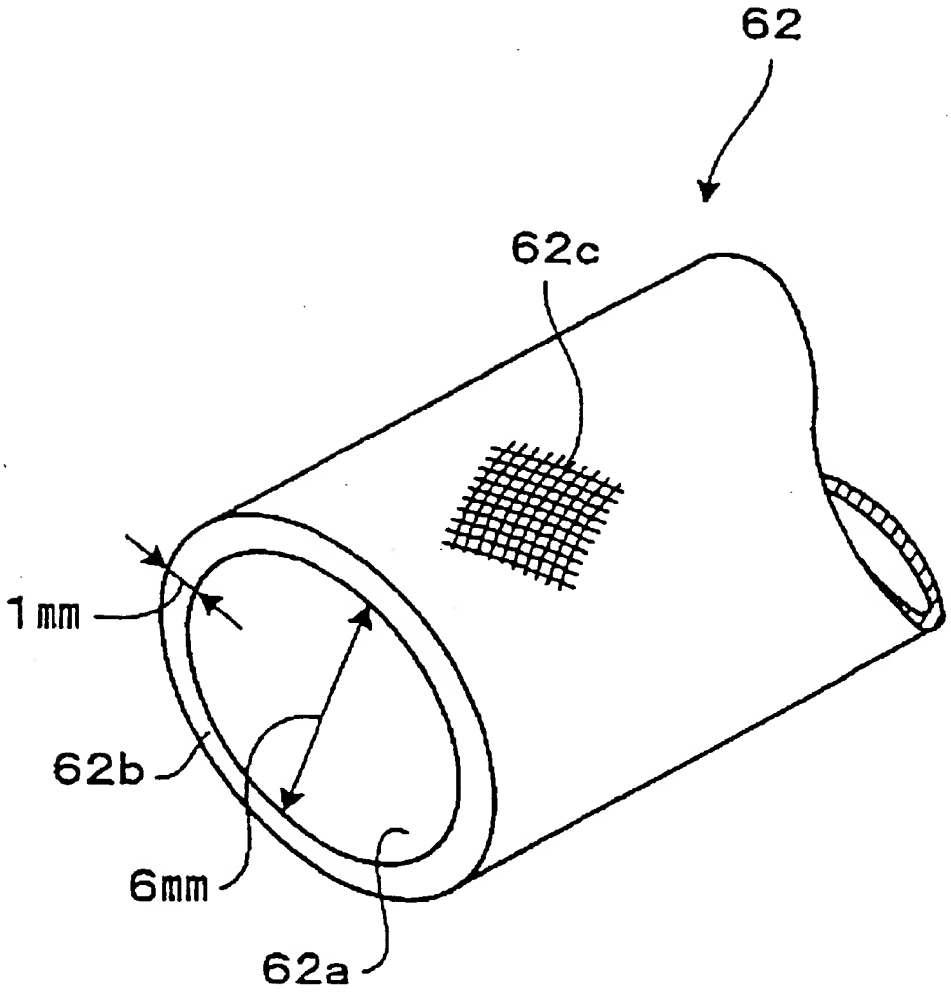

FIG. 15

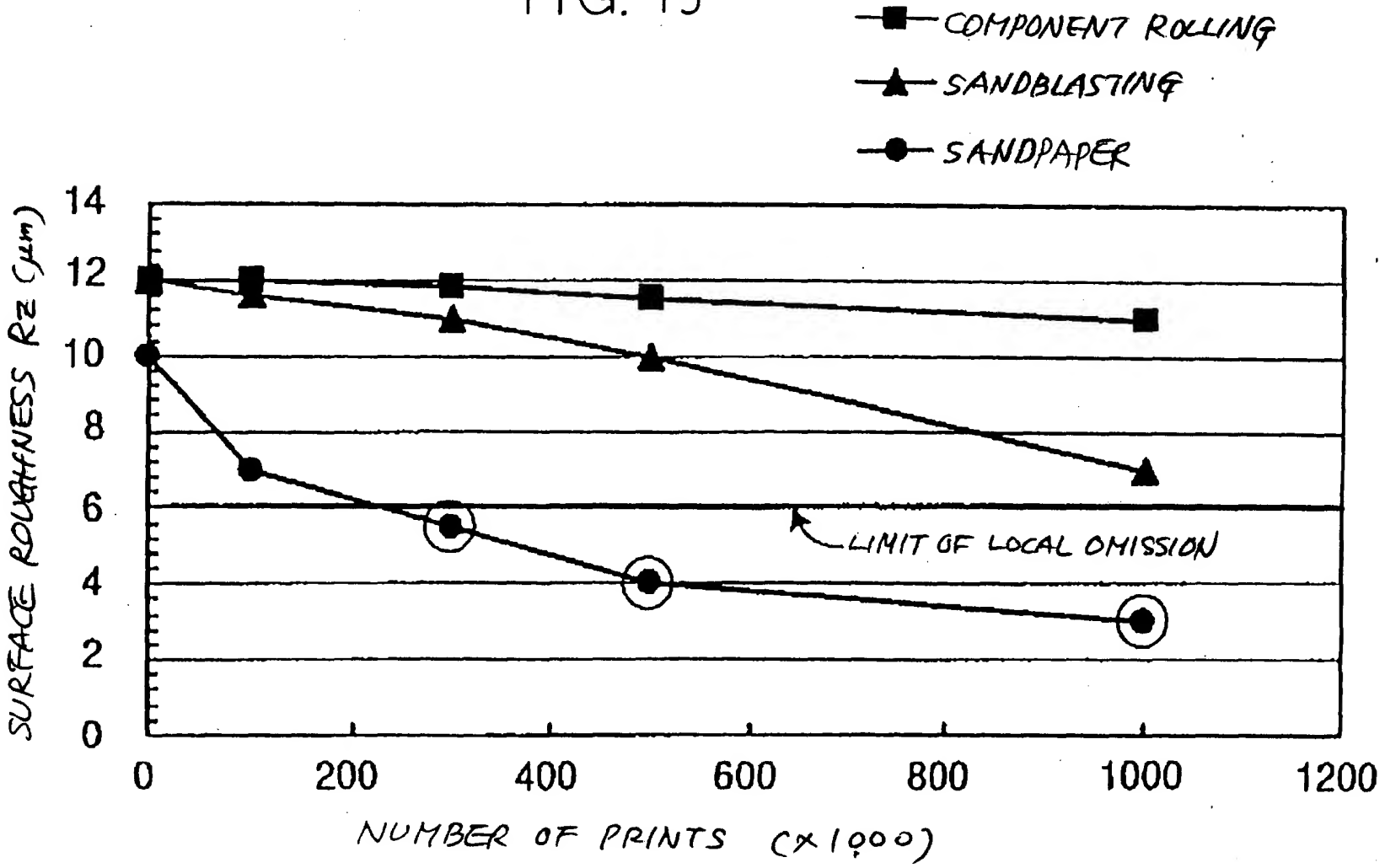
COMPONENT ROLLING
SANDBLASTING
SANDPAPER
SURFACE ROUGHNESS Rz (μm)
14
12
10
8
6
4
2
0
0
200
400
600
800
1000
1200
LIMIT OF LOCAL OMISSION
NUMBER OF PRINTS (×1000)

FIG. 16

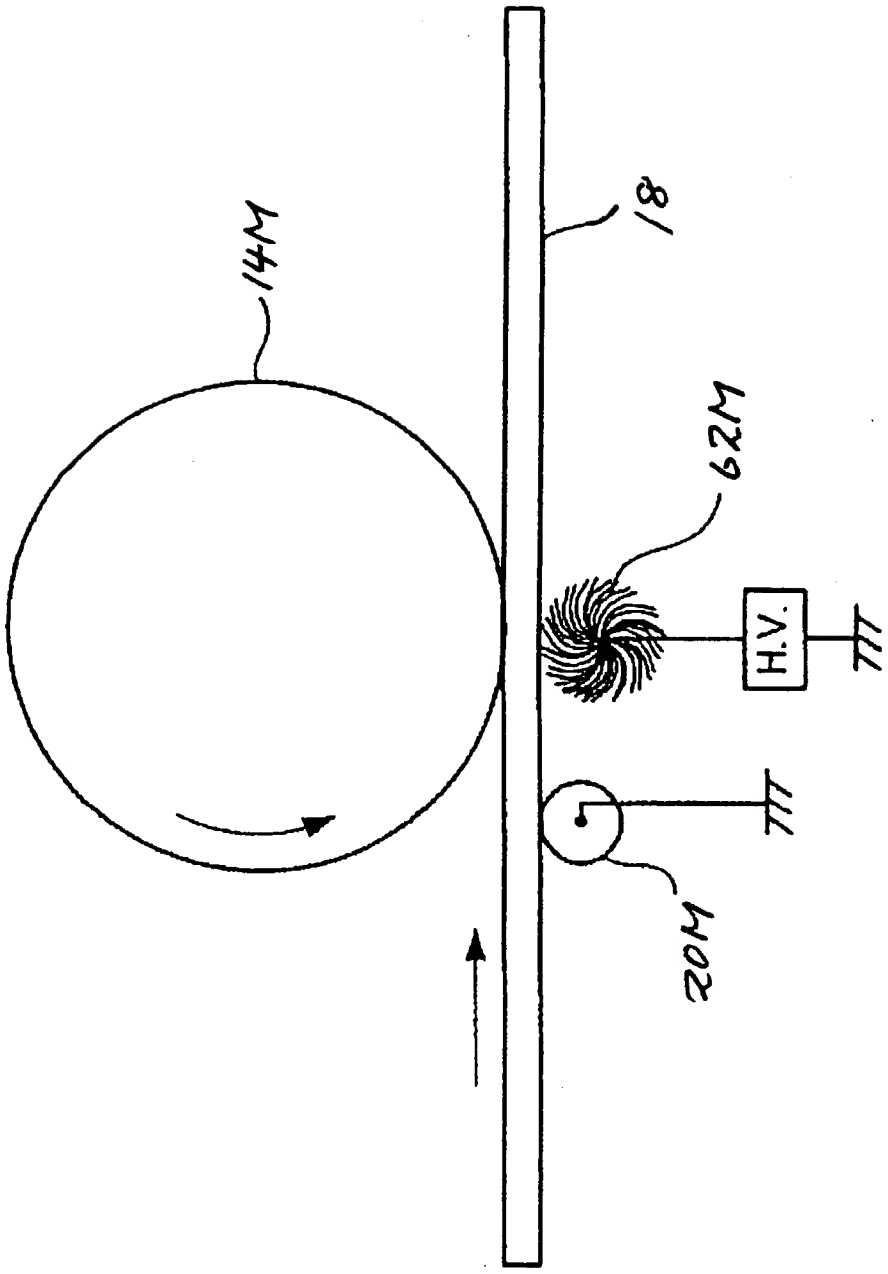

FIG. 17

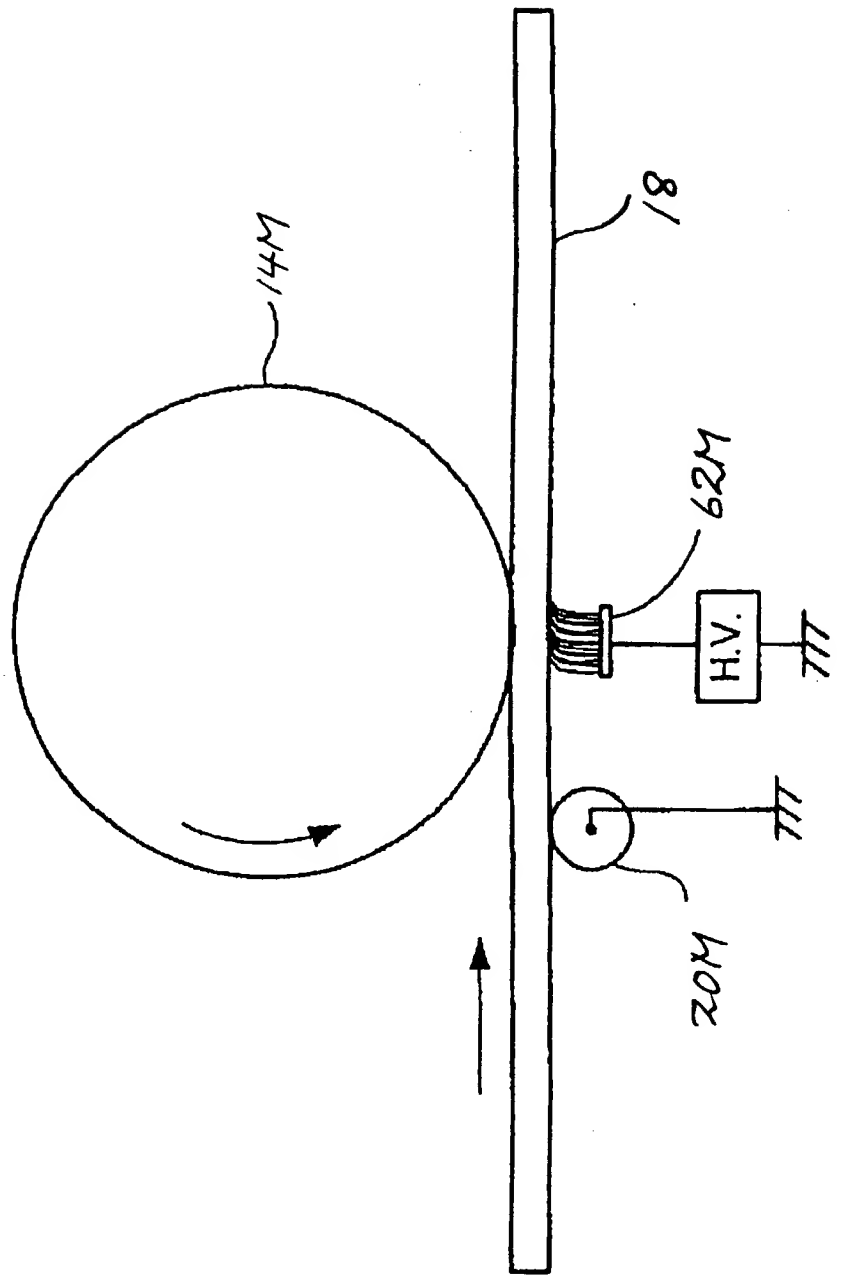

FIG. 18

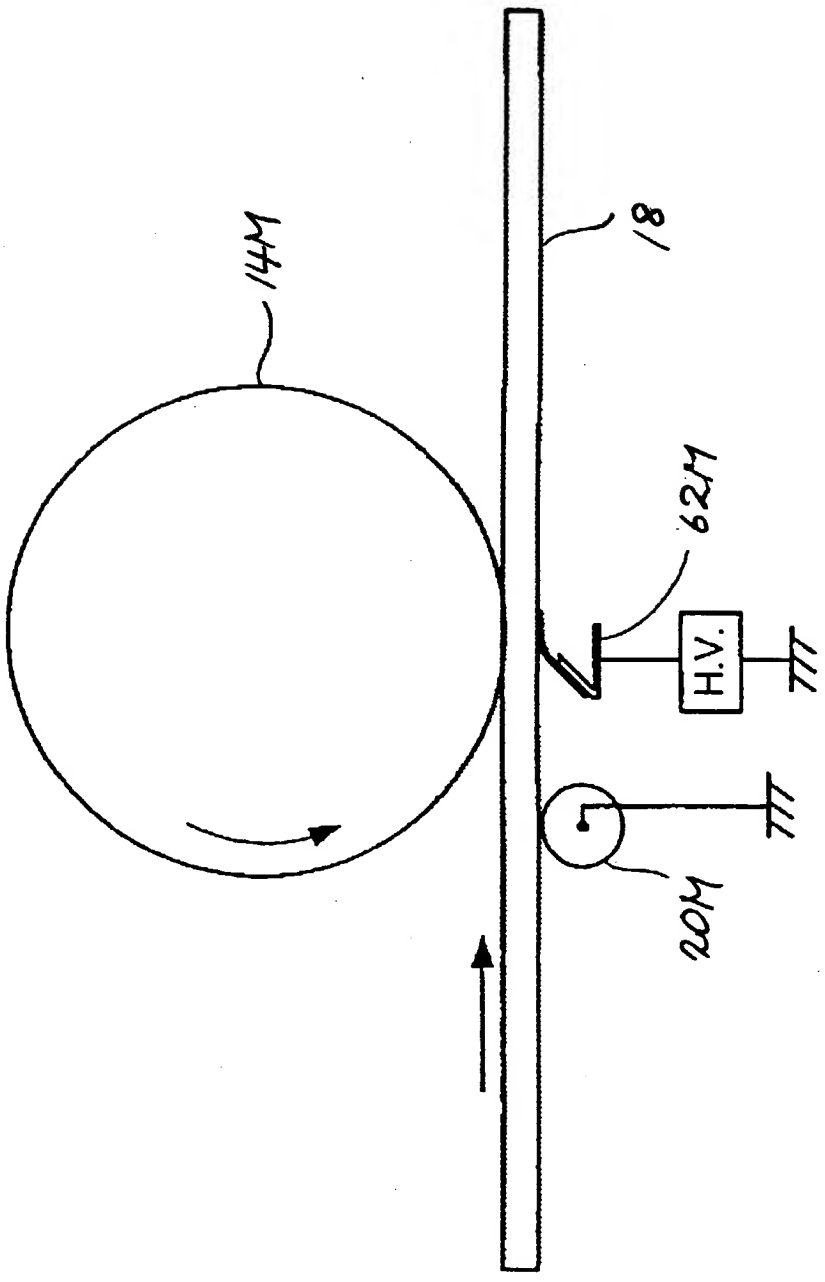

FIG. 19